

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P 04 149 WO	FOR FURTHER ACTION	
	See Form PCT/PEA/416	
International application No. PCT/DK2004/000635	International filing date (day/month/year) 18.09.2004	Priority date (day/month/year) 26.09.2003
International Patent Classification (IPC) or national classification and IPC F03D1/00		
Applicant NEG MICON A/S et al		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 8 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> <i>(sent to the applicant and to the International Bureau) a total of 5 sheets, as follows:</i></p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> <i>(sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</i></p>		
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>		
Date of submission of the demand 26.07.2005	Date of completion of this report 19.01.2006	
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer de Rooij, M Telephone No. +31 70 340-2306	



IAP20 Rec'd PCT/PTO 27 MAR 2006

Box No. I Basis of the report

- With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
 - international search (under Rules 12.3 and 23.1(b))
 - publication of the international application (under Rule 12.4)
 - international preliminary examination (under Rules 55.2 and/or 55.3)
- With regard to the **elements*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):
 - a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

Description, Pages

1-7 as originally filed

Claims, Numbers

1-26 filed with telefax on 12.12.2005

Drawings, Sheets

1/10-10/10 as originally filed

- The amendments have resulted in the cancellation of:
 - the description, pages
 - the claims, Nos.
 - the drawings, sheets/figs
 - the sequence listing (*specify*):
 - any table(s) related to sequence listing (*specify*):
- This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - the description, pages
 - the claims, Nos.
 - the drawings, sheets/figs
 - the sequence listing (*specify*):
 - any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/DK2004/000635

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-3,5-26
	No: Claims	4
Inventive step (IS)	Yes: Claims	1-3,9-26
	No: Claims	4-8
Industrial applicability (IA)	Yes: Claims	1-26
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

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International application No.

PCT/DK2004/000635

Re Item V**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

1. Reference is made to the following documents:

D1: WO 03/048569 A (TEICHERT PAUL) 12 June 2003

D2: WO 96/10130 A (HEHENBERGER GERALD) 4 April 1996

CLARITY:

2. The application does not meet the requirements of Article 6 PCT, because claims 4 and 24 are not clear.

2.1 In claim 4, a method step ("said crane ... the hub") is included in a method directed at a product. This renders the claim unclear (see also PCT Guidelines 5.37). Claim 4 has therefore been interpreted as "Equipment for servicing ... crane to the hub, and said crane being suitable for lowering ... to the hub".

2.2 Also in claim 24, it is not clear whether the claim is directed at a process ("intended for being used") or at a product (a wind turbine). See also PCT guidelines 5.37. The claim has been interpreted as being directed to a method.

INDEPENDENT CLAIM 4 (APPARATUS):

3. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 4 is not new in the sense of Article 33(2) PCT.

3.1 Document D1 discloses (references in parentheses applying to this document):

Equipment for servicing a wind turbine (p.17, l. 13-31) after the hub of the wind turbine has been mounted, said equipment being provided with means for primarily securing the equipment including a crane to the hub (p.22, l.13-15), and said crane being **suitable for** lowering and hoisting wind turbine appliances from and to the hub.

3.2 The subject-matter of claim 4 therefore lacks novelty.

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4. Claims 5-8 (dependent on claim 4) do not contain any features which, in combination with the features of any claim, to which they refer, meet the requirements of the PCT in respect to novelty or inventive step, since the additional features fall within the scope of customary practice of a person skilled in the art.
5. The combination of features of dependent claim 9 is neither known from, nor rendered obvious by the available prior art. There is no hint in the prior art to include the features of claim 9 in the equipment known from D1.
6. Dependent claims 10-23, when interpreted dependent on claim 9 are thereby also considered novel and inventive.

INDEPENDENT CLAIMS 1, 24 AND 26 (METHODS):

7. In claim 1, "lowering and hoisting wind turbine appliances from and to the hub" is defined. From the application as a whole, the following **interpretation** of this passage can be deducted: lowering and hoisting appliances that are subsequently installed in the wind turbine (not lowering and hoisting of appliances used in servicing the wind turbine). This interpretation however should have been explicitly mentioned or described in claim 1.

Such an amended claim 1 would have fulfilled the requirements of the PCT with respect to novelty and inventive step for the following reasons:

Document D2 (not D1) is regarded as being the closest prior art to the subject-matter of claim 1, and shows:

A method of conducting service on a wind turbine after the wind turbine is erected and after the hub of the wind turbine is mounted on the main shaft of the wind turbine. Wind turbine appliances are lowered and hoisted with a nacelle based crane.

7.1 The subject-matter of claim 1 differs from this known method of servicing a wind turbine in that a crane is mounted on the hub of the wind turbine and appliances are lowered and hoisted with this hub based crane.

7.2 The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

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7.3 The problem to be solved by the present invention may be regarded as conducting service to any part of the hub and the different systems of the hub.

7.4. The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

A crane used in servicing a wind turbine is normally mounted on the tower or on the nacelle, since these are solid structures. The only hint in the prior art, to secure a crane to a hub is found in D2 (p. 22, I.13-15). D2 however relates to a method of cleaning a wind turbine blade, not to hoisting wind turbine appliances from and to the hub.

The skilled person would not, without the exercise of inventive skill, combine the teachings of D1 (about hoisting wind turbine appliances) and D2 (about cleaning a wind turbine blade).

8. The same reasoning applies, mutatis mutandis, to independent claims 24 (see §2.2) and 26.

9. Claims 2, 3 and 25 are dependent on claims 1 and 24 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

INDUSTRIAL APPLICABILITY:

10. The claimed invention is industrially applicable in the field of wind turbines (Article 33(4) PCT).

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CLAIMS

1. A method of conducting service on a wind turbine after the wind turbine is erected and after the hub of the wind turbine is mounted on the main shaft of the wind turbine, said method comprising the steps of:

mounting of servicing equipment including a crane on the hub of the wind turbine, and

10 lowering and hoisting wind turbine appliances from and to the hub with said hub mounted servicing equipment including a crane.

15 2. A method according to claim 1, where the servicing equipment is mounted to the outside surface of the hub, and where appliances to be lowered from and hoisted to the hub is capable of being lowered and hoisted to the hub at a front of the hub.

20 3. A method according to claim 1 or claim 2, where the servicing equipment is mounted by means of already available holes, said holes formerly used for hoisting the hub to the main shaft of the wind turbine.

25 4. Equipment for servicing a wind turbine after the hub of the wind turbine has been mounted, said equipment being provided with

means for primarily securing the equipment including a crane to the hub, and

said crane lowering and hoisting wind turbine appliances from and to the hub.

5. Equipment according to claim 4, said equipment being provided with fastening means, preferably bolts, for securing the equipment to already available holes, said holes formerly used for hoisting the hub to the main shaft of the wind turbine.
10. Equipment according to claim 5, where the equipment is provided with a first connecting piece intended for being secured to a first set of already available holes.
15. Equipment according to claim 5 or 6, where the equipment is provided with a second connecting piece intended for being secured to a second set of already available holes.
20. Equipment according to claim 6 or 7, where the first connecting piece is intended primarily for securing a crane, constituting part of the equipment, to the hub.
9. Equipment according to any of claims 4-8, where the second connecting piece is intended primarily for securing a gangway, constituting part of the equipment, to the hub.
25. 10. Equipment according to any of claims 4-9, where said connecting piece for connecting the hub with the remainder of the equipment being provided with primary holes for inserting bolts to be secured to the existing holes in the hub and thereby securing the connecting piece to the hub, and said connecting piece also being provided with

secondary holes for inserting bolts for securing the remainder of the equipment to the connecting piece.

11. Equipment according to claim 10, where a cavity is formed in a 5 bottom of the connecting piece, said cavity being intended for containing a cement-like substance when the connecting piece is secured to the hub.
12. Equipment according to claim 11, where the cavity is delimited by 10 a collar extending circumferentially along the bottom of the connecting piece, and said collar limiting any flow from the cavity of the cement-like substance.
13. Equipment according to any of the claims 10-12, where the 15 connecting piece, preferably the collar of the connecting piece, is provided with means for releasing the adherence by the cement-like structure of the connecting piece to the hub.
14. Equipment according to any of the claims 11-13, where the cavity 20 is delimited by a disc-like member extending inside the connecting piece, and said disc-like member limiting any flow from the cavity of the cement-like substance.
15. Equipment according to any of the claims 10-14, where the 25 connecting piece comprises a flange extending circumferentially along the connecting piece, said flange being provided with means for securing the remainder of the equipment to the connecting piece.
16. Equipment according to claim 10 and claim 14, where the 30 connecting piece is provided with an upper disc-like member and

where guiding liners for bolts extend between the upper disc-like member and the lower disc-like members.

17. Equipment according to any of the claims 10-16, where the 5 guiding liners are positioned relative to each other in the connecting piece corresponding to a positioning of already available holes in the hub of the wind turbine.

18. Equipment according to any of the claims 8-17, where said crane 10 being provided with primary holes for inserting bolts for securing the crane to the connecting piece and thus to the hub.

19. Equipment according to claim 18, where the crane is provided 15 with a jib connected to a mast of the crane, and said jib being swivable around a substantially vertical hinged connection and said jib extending outwards in relation to the mast and forwards in relation to a direction being a forwards direction of the wind turbine when the crane is secured to the hub.

20. Equipment according to claim 19, where links are provided 20 between the mast and the hinged connection, said links extending outwards in relation to the mast and forwards in relation to a direction being a forwards direction of the wind turbine when the crane is secured to the hub.

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21. Equipment according to claim 20, where the links have a greater dimension at an end where the links are attached to the mast and have a smaller dimension at an end where the jib by means of the hinged connection is attached to the links.

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22. Equipment according to claim 20 or claim 21, where the links are made of a material lighter than steel.

23. Equipment according to any of the claims 18-22, where the jib 5 has an I-shaped cross section, alternatively an inverted T-shaped cross-section and that wheels of a trolley are intended for being supported on the transversal parts of the profile.

24. Wind turbine comprising

10 a hub wherein the surface of said hub includes holes initially used for attaching the hub to a crane used when erecting the wind turbine, and

15 said holes subsequently intended for being used for securing service equipment including a crane according to any of claims 4-23 to the surface of the hub.

25. Wind turbine according to claim 24, wherein the surface of said hub being provided with holes initially used for attaching the hub to a crane used, when erecting the wind turbine, and said holes subsequently intended for being used for securing service equipment to the surface of the hub.

26. Use of holes in the surface of a hub in a wind turbine according 25 to claim 24 and 25, said holes initially having been used for attaching the hub to a crane used, when erecting the wind turbine, and said holes subsequently used for securing service equipment to the surface of the hub.

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